

Bruce,

I applaud your desire to get the Tech Team moving, and especially your desire to pose specific questions for the Team to address. However, I think you have jumped over several very important issues that need to be addressed *before* we get to the level you have put forward. Let me be specific. We need to sort out questions of scale or magnitude of effects, whether or not average parameters are appropriate to describe estuarine/biological processes, mechanisms which might be responsible for relationships assumed in the games, dueling data sets, etc. Most of the questions you propose assume facts or mechanisms that may be in dispute, and we need to deal with that level first. I have discussed this with Pete R. and B.J., among others, and I believe we all agree on this. I'd like to take a stab at "decomposing" some of the questions into their component parts to get at some of the assumptions that need to be examined, but first I'd like to make a couple of general suggestions.

First, I think the Tech Team(s) need to at least be aware of the greater *context* within which the EWA will operate. This means that we should not limit ourselves to problems the EWA might be expected to address. This may not be in conflict with what you wrote, but I think we should not ignore the relationships with, for example, EWA gains for fall chinook and harvest management gains for the same stocks. It also means that we should acknowledge uses of EWA resources beyond just water manipulation (habitat, for example).

For the issue of scale, we might all agree that export manipulation along with changes in salvage procedures (in the near term) could reduce steelhead direct mortality by, say, 80%, but is this a "big deal" in a population context? Maybe yes; maybe no...the technical team should address this directly by dealing with the assumptions underlying the game model as well as the data. This also means putting the results in an overall population context. We need to deal with the cost issue, as well, at least at some level. After all this is an *Environmental Water Account*, and if the cost of an action is higher than it should be relative to expected population-level gains, we may have squandered assets on something relatively trivial, and not have sufficient assets to deal with something important down the road.

We are all very concerned that questions related to delta problems have historically been expressed in terms of project-related average hydrologic parameters such as outflow, Q-west, X2, E/I ratios, etc., so that all the answers are denominated in terms of these parameters. Of necessity, this leads to a very skewed information base from which to work. Many of the assumptions which we feel need examination relate to this rather narrow view of delta ecology, as if nothing else is going on. This isn't right.

The Tech Team needs to address the issue of adult equivalence head on. The DEFT has been dodging this issue for much too long, and it is time to deal with it directly. The Tech Team also needs to deal with issues such as the production side of the equation, indices v. actual population size and whether it is satisfactory to use indices to make the kind of decisions demanded by the games, tradeoffs between upstream and delta benefits, linkages

with other actions, etc. Some of these are touched on by your questions, but I think we need to wrestle all these to the ground before getting into the kind of questions you propose.

Taking a look at your questions:

1. *Direct mortality impacts*

You state, "The importance of such mortality to various fish populations is not well understood." To my mind, this cries out for an adult equivalence analysis. Even if we don't have "near-perfect" life stage and cohort recruitment data, using adult-equivalence accounting would be a vast improvement over some non-parametric index of life stage importance, or not discriminating at all.

1A. *Relationships between spawning adult population size and subsequent juvenile abundance...*

I think this makes my point about adult equivalence accounting. We need to add other intervening factors, in my opinion, such as inland and ocean harvest for salmon (for example). This also means looking at the apparent inconsistencies in the Chippis Is. Trawl tag returns and the ocean tag returns for the same release groups. This drives the assessment of the relative magnitude of central delta mortality for salmon as well as the significance of EWA actions. Other species should be examined in the same way, but the examination will of necessity be qualitative. Still, any potential disagreement about the assumptions underlying population dynamics and mechanisms governing survival should surface.

1B. *Environmental Modifiers...*

Are the entrainment rates you refer to functions of whole populations? I think they should be to the extent possible, even if only a crude estimate of the percent-of-population effect is made. We need to come to grips with the issue of whether entrainment is likely to be population limiting in the greater context for each species.

2. *Indirect mortality...*

You state, "Mortality in the delta is high at times for species such as..." How do we know? This is an assumption for which there is precious little real data. We don't even know much about trophic relationships in the delta, at least not quantitatively. As far as I can determine, the vast majority of "information" on this topic is speculation. We have some information from the paired releases of salmon, but these data are seriously flawed in terms of both experimental design (no acclimation; uncontrolled variables; narrow or one-sided spectrum of flows; etc.) and data analysis (refer to the Newman/Rice v. Geibel debate). In many cases other variables are available and are (in my judgement) more likely to explain the observed data. For other species, speculation comprises most of the information base. It's OK to speculate, *but the decision-makers and the policy folks must be informed about*

*the extent to which the EWA assumptions arise from speculation.* If there is disagreement about this, the policy folks must be informed about the disagreement. The Tech Team must deal with *this* question before tackling *any* of the issues assuming high relative delta mortality. This means proposing a specific mechanism (testable hypothesis) responsible for the differential. I suggest that we don't *really* know if distribution-dependent differential mortality rates actually exist for most species. Once we deal with this question, we can graduate to the question of significance at the population level.

2A. *Measures of indirect mortality...*

You refer to "observed indirect mortality". What is this? I am not aware of much in the way of observed indirect mortality other than the paired release data for salmon, the data analysis of which is a subject of rather intense disagreement. We need to deal with the data analysis and interpretation first, then go on to the question you pose. You have proposed several very interesting and important parameters, however, and I agree that they should be discussed after we deal with the underlying assumptions.

2B. *Causes of "relatively high" delta mortality...*

This opening sentence assumes facts which I think are in dispute, or at least need Tech Team examination. The other side of the coin in your next sentence deals to some extent with production issues, and I believe the Tech Team should address them. These could even provide fertile ground (?) for "creative" use of EWA assets.

2C. *Environmental modifiers.*

This is a good question, but we need to settle the issue of actual differential rates first, then graduate to the issues of how to modify them.

2D. *Management options.*

Again, this assumes facts which may be in dispute, or at least are not well understood. It's not that we should not deal with these options, it's just that we need to have the policy folks *clear* about the degree of speculation underlying these matters.

3. *Modifying flows.*

You state that flow patterns are "believed to influence the distribution and susceptibility of various life stages..." This statement glosses over the fact that there is more than one belief system related to this rather grand subject. The Tech Team needs to grapple directly with the specific differences in the beliefs related to life stage distribution and susceptibility which have plagued the DEFT from the beginning. We all promised ourselves we would do this and it's time to make good on the promises.

3A. *Evidence that moving X2 away from the influence of the export pumps...*

The way this is worded suggests that we all agree pretty much where the influence of the pumps begins and ends...or rather what the steepness of the gradient of influence is, and how it is modified by tidal v. pumping influences. I submit that there is no such agreement, and that the Tech Team needs to deal carefully with this set of issues. Underlying assumptions need to be specified and areas of disagreement brought to the surface, so that they can be included in any presentation to Q/S and in any other work product of the group. We need to deal with the contrary case as well. That is, we need to identify evidence to the contrary, when going down the list of assumed effects.

3C. *Management options.*

To ask what size and duration of flow modifications can be expected to reduce mortality of each species jumps over a couple of underlying assumptions that may be in dispute. The links in the chain of logic are: 1) fresh water flow entering and/or leaving the delta drives life stage mortality; 2) other flow patterns are irrelevant; 3) modifying inflow and/or outflow will significantly modify life stage mortality in the desired direction; 4) this modification will have a population-level significance. Each link in the chain must be agreed to if the proposition is to be accepted. This is a job for the Tech Team.

4. *Barrier impacts...*

I am not sure that "entrainment" is being used properly in this context. It sounds like you are saying that if a fish enters the delta, it is "entrained". If this is what you mean, I strongly suggest using another word. "Entrainment" is a term of art which carries much too much baggage to be used this way. I think we can all agree that the barrier-related impacts on various species, particularly delta smelt, that reside within (are "entrained" into?) the delta are the subject of much speculation. If this is so, why are we assuming the impacts? We need "grounds more relative than this".

4A. *... How do barrier operations affect the distribution and mortality rates of fish such as striped bass and delta smelt in the central Delta?*

First we need to examine evidence on the extent to which the phenomenon exists, *then* we can ask "how?".

4B. *Environmental modifiers.*

You ask, "What flow, export, or other factors are believed to change the general relationship[s] between barrier operations and each species?" I believe it is *much* more important to ask, "*Why* do we believe these things?"

5A. *What are the likely impacts of relaxing requirements...*

*Why* are impacts considered “likely”? *Why* are benefits “expected”? The Tech Team needs to answer these questions first.

5B. *Environmental Modifications...*

I suggest that the Tech Team needs to also address both physical habitat and, in the case of salmon, harvest restrictions.

I hope these points help focus our work on areas of potential disagreement *as well as* areas of general agreement. Until we deal with the issues of underlying mechanisms and assumptions, we will not get “down the road” to a successful conclusion of this business.

Buell

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